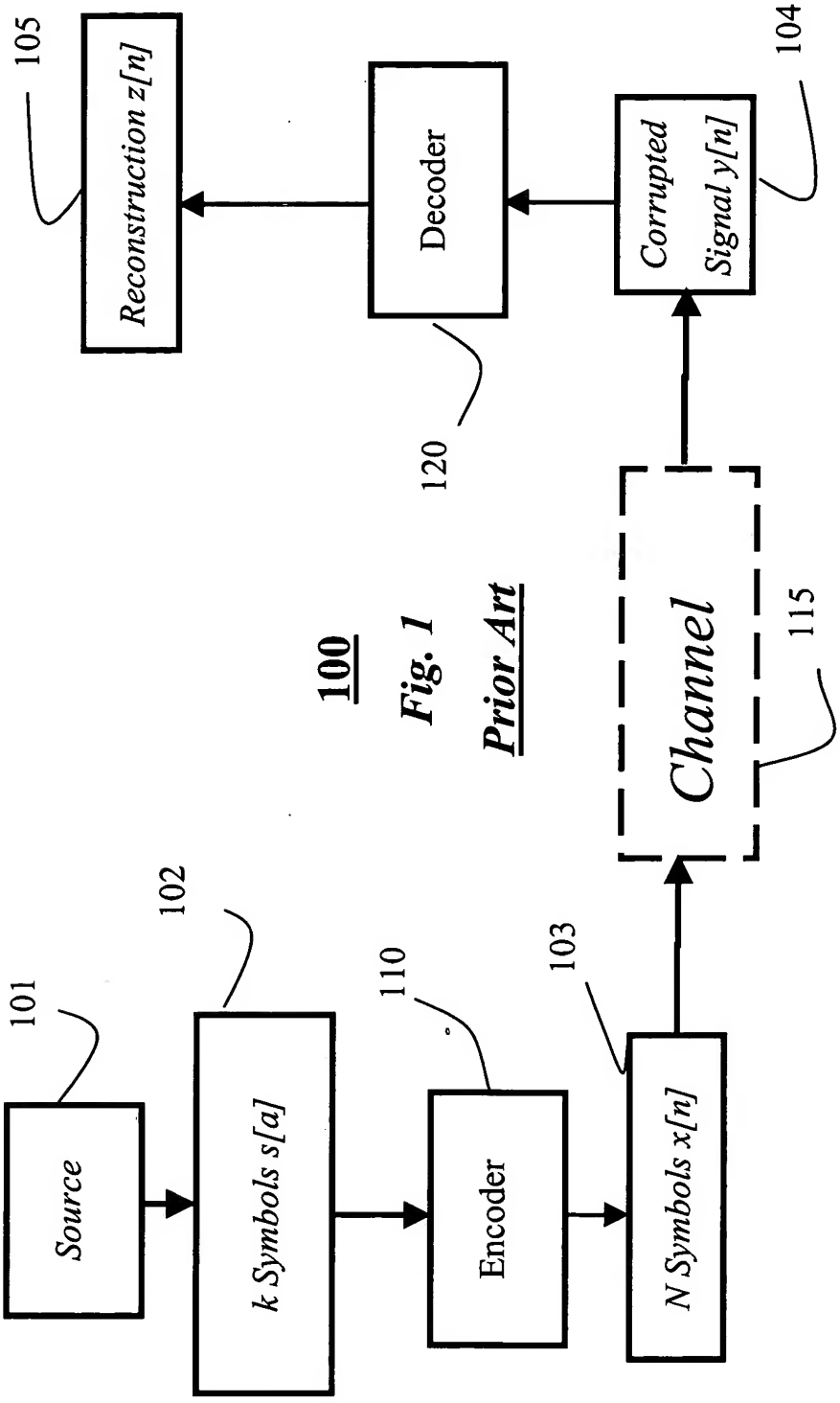

100

Fig. 1 Prior Art

*	0	1
0	0	0
1	0	1

+	0	1
0	0	1
1	1	0

Fig. 2
Prior Art

+	0	1	2
0	0	1	2
1	1	2	0
2	2	0	1

*	0	1	2
0	0	0	0
1	0	1	2
2	0	2	1

Fig. 3
Prior Art

*	0	1	2	3
0	0	0	0	0
1	0	1	2	3
2	0	2	3	1
3	0	3	1	2

+	0	1	2	3
0	0	1	2	3
1	1	0	3	2
2	2	3	0	1
3	3	2	1	0

Fig. 4
Prior Art

*	0	1	2	3	4
0	0	0	0	0	0
1	0	1	2	3	4
2	0	2	4	1	3
3	0	3	1	4	2
4	0	4	3	2	1

+	0	1	2	3	4
0	0	1	2	3	4
1	1	2	3	4	0
2	2	3	4	0	1
3	3	4	0	1	2
4	4	0	1	2	3

Fig. 5
Prior Art

+	0	1	2	3	4	5	6	7
0	0	1	2	3	4	5	6	7
1	1	0	3	2	5	4	7	6
2	2	3	0	1	6	7	4	5
3	3	2	1	0	7	6	5	4
4	4	5	6	7	0	1	2	3
5	5	4	7	6	1	0	3	2
6	6	7	4	5	2	3	0	1
7	7	6	5	4	3	2	1	0

+	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7
2	0	2	4	6	3	1	7	5
3	0	3	6	5	7	4	1	2
4	0	4	3	7	6	2	5	1
5	0	5	1	4	2	7	3	6
6	0	6	7	1	5	3	2	4
7	0	7	5	2	1	6	4	3

Fig. 6
Prior Art

+	0	1	2	3	4	5	6	7	8
0	0	1	2	3	4	5	6	7	8
1	1	2	0	4	5	3	7	8	6
2	2	0	1	5	3	4	8	6	7
3	3	4	5	6	7	8	0	1	2
4	4	5	3	7	8	6	1	2	0
5	5	3	4	8	6	7	2	0	1
6	6	7	8	0	1	2	3	4	5
7	7	8	6	1	2	0	4	5	3
8	8	6	7	2	0	1	5	3	4

*	0	1	2	3	4	5	6	7	8
0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8
2	0	2	1	6	8	7	3	5	4
3	0	3	6	4	7	1	8	2	5
4	0	4	8	7	2	3	5	6	1
5	0	5	7	1	3	8	2	4	6
6	0	6	3	8	5	2	4	1	7
7	0	7	5	2	6	4	1	8	3
8	0	8	4	5	1	6	7	3	2

Fig. 7

Prior Art

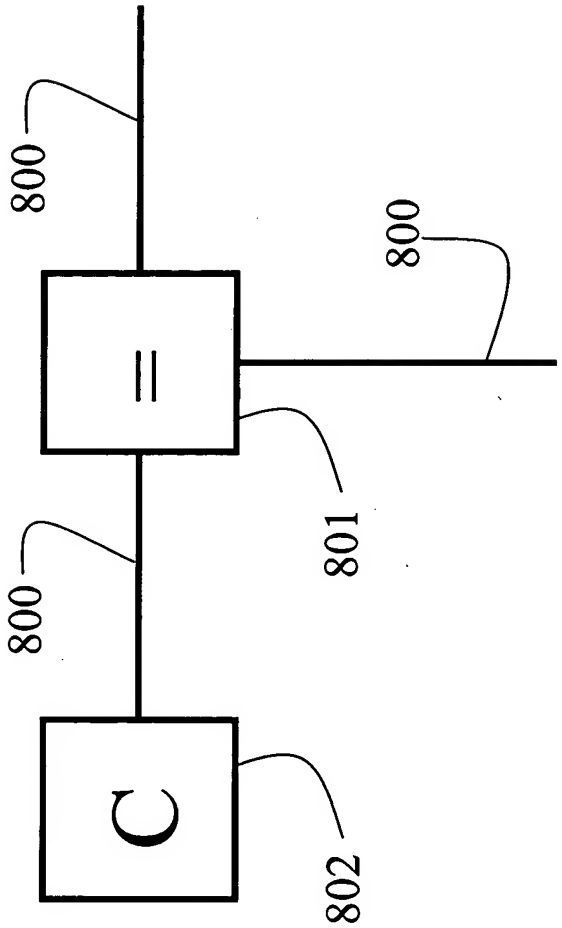

Fig. 8
Prior Art

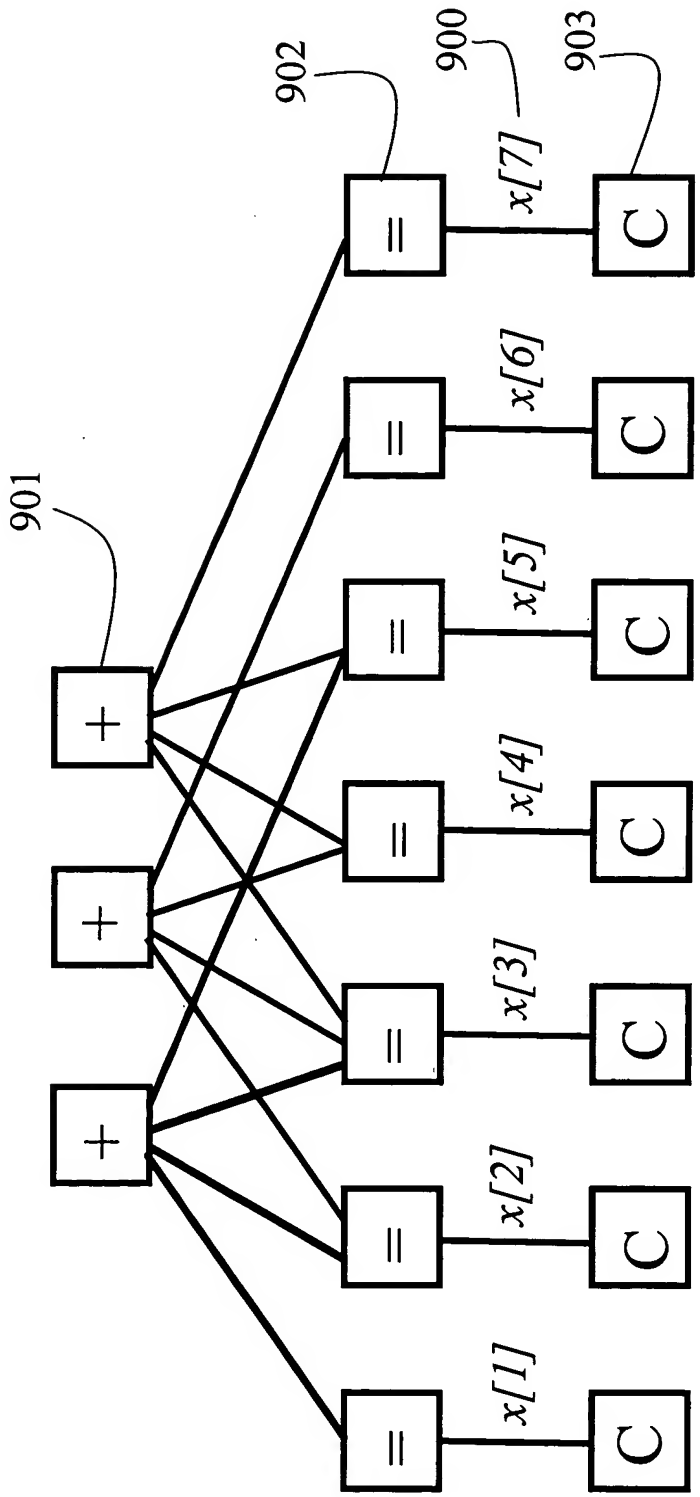

Fig. 9

Prior Art

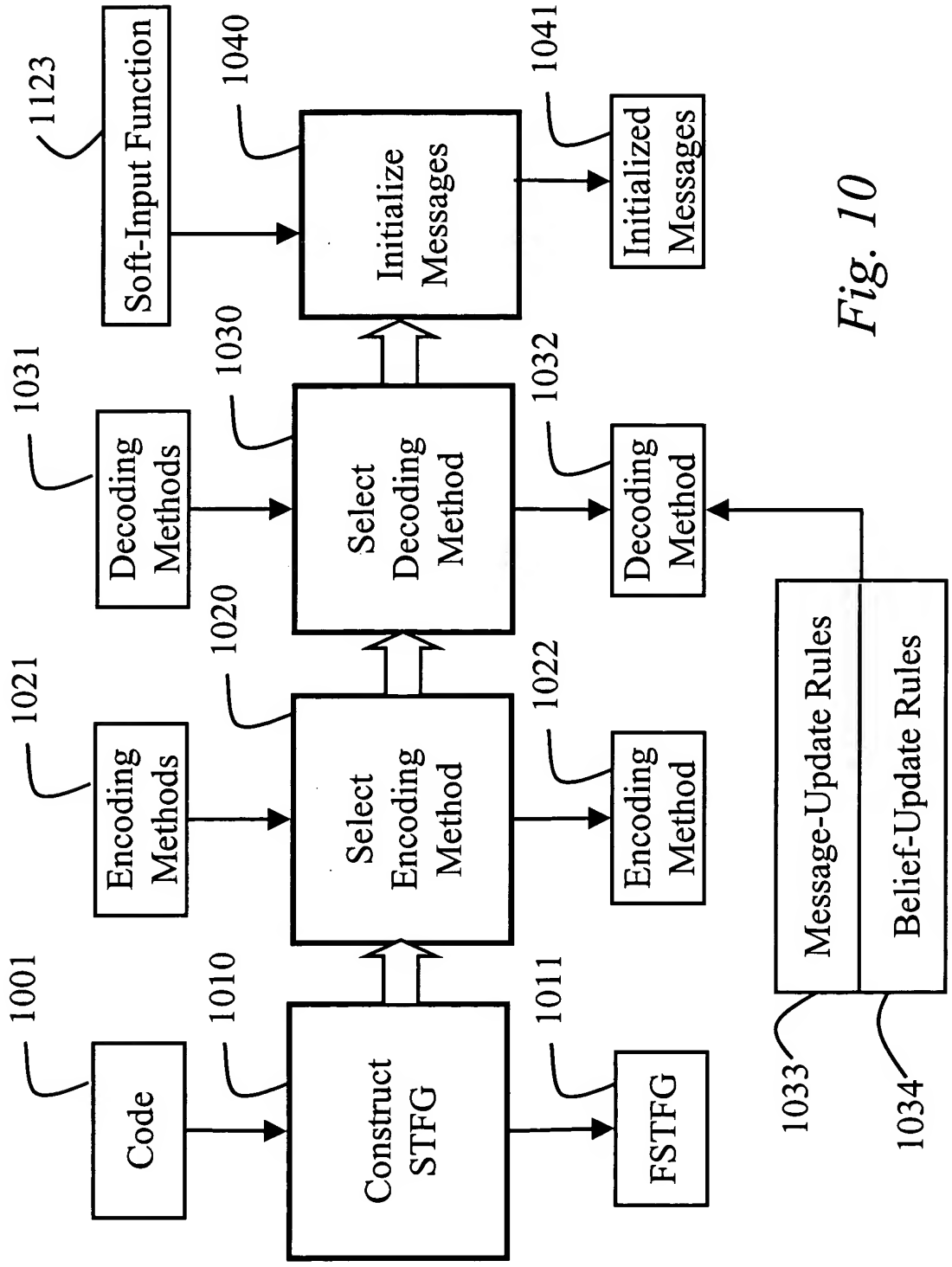
1001
Code
1010
Construct STFG
1011
FSTFG
1020
Select Encoding Method
1021
Encoding Methods
1022
Encoding Method
1030
Select Decoding Method
1031
Decoding Methods
1032
Decoding Method
1033
Message-Update Rules
1034
Belief-Update Rules
1040
Initialize Messages
1041
Initialized Messages
1123
Soft-Input Function

Fig. 10

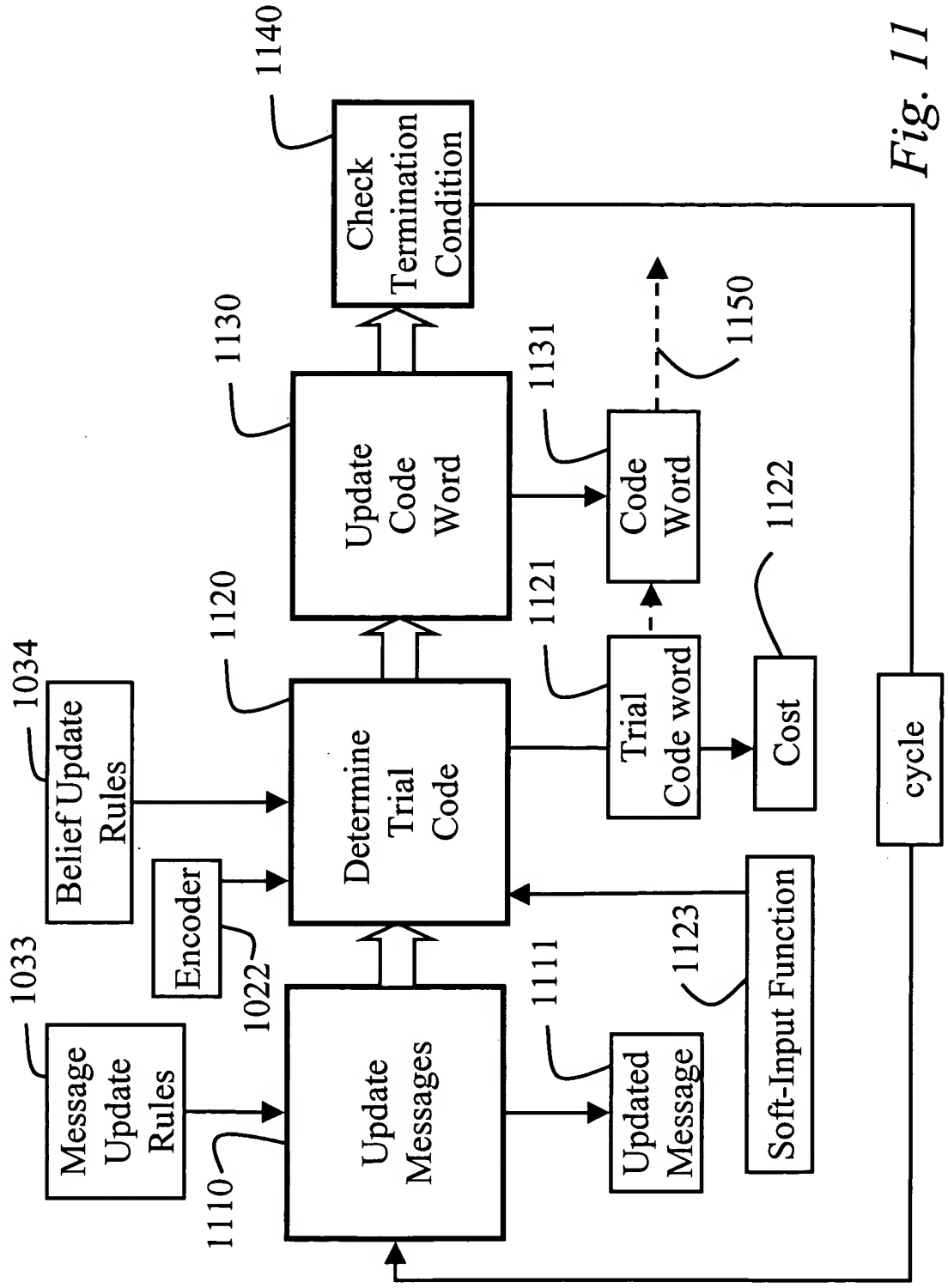
1140
Check Termination Condition
1130
Update Code Word
1131
Code Word
1150
1120
Determine Trial Code
1121
Trial Code word
1122
Cost
cycle
1034
Belief Update Rules
Encoder
1022
1033
Message Update Rules
1110
Update Messages
1111
Updated Message
1123
Soft-Input Function

Fig. 11

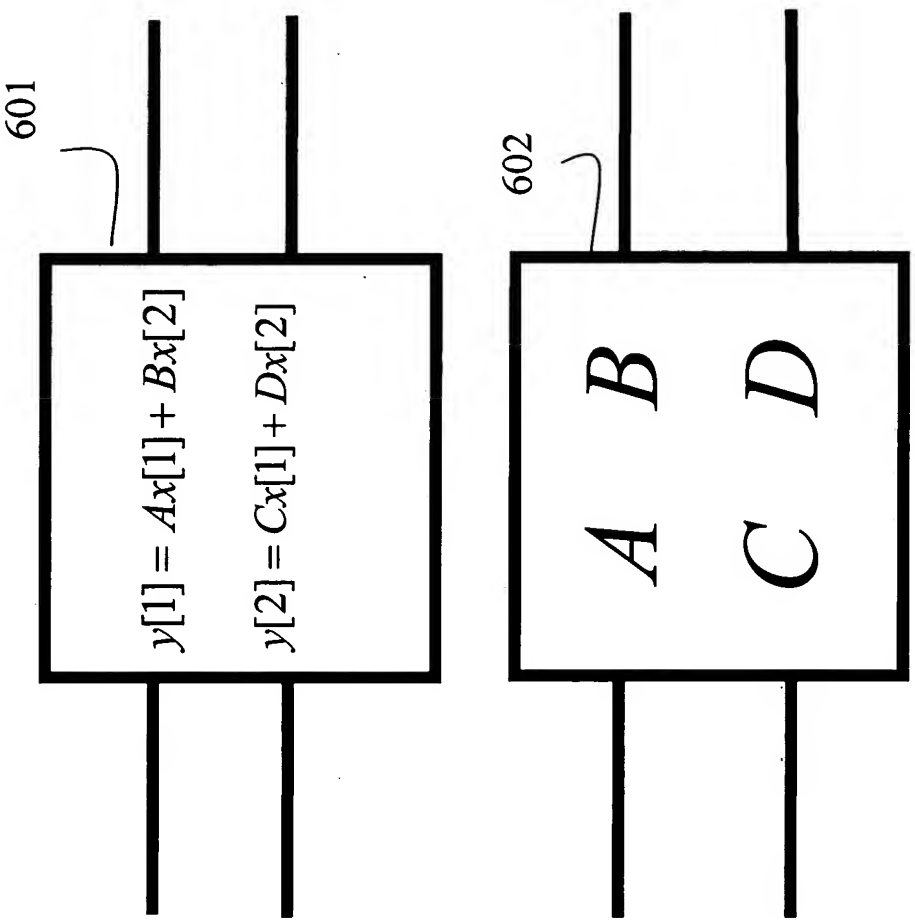

Figure 12

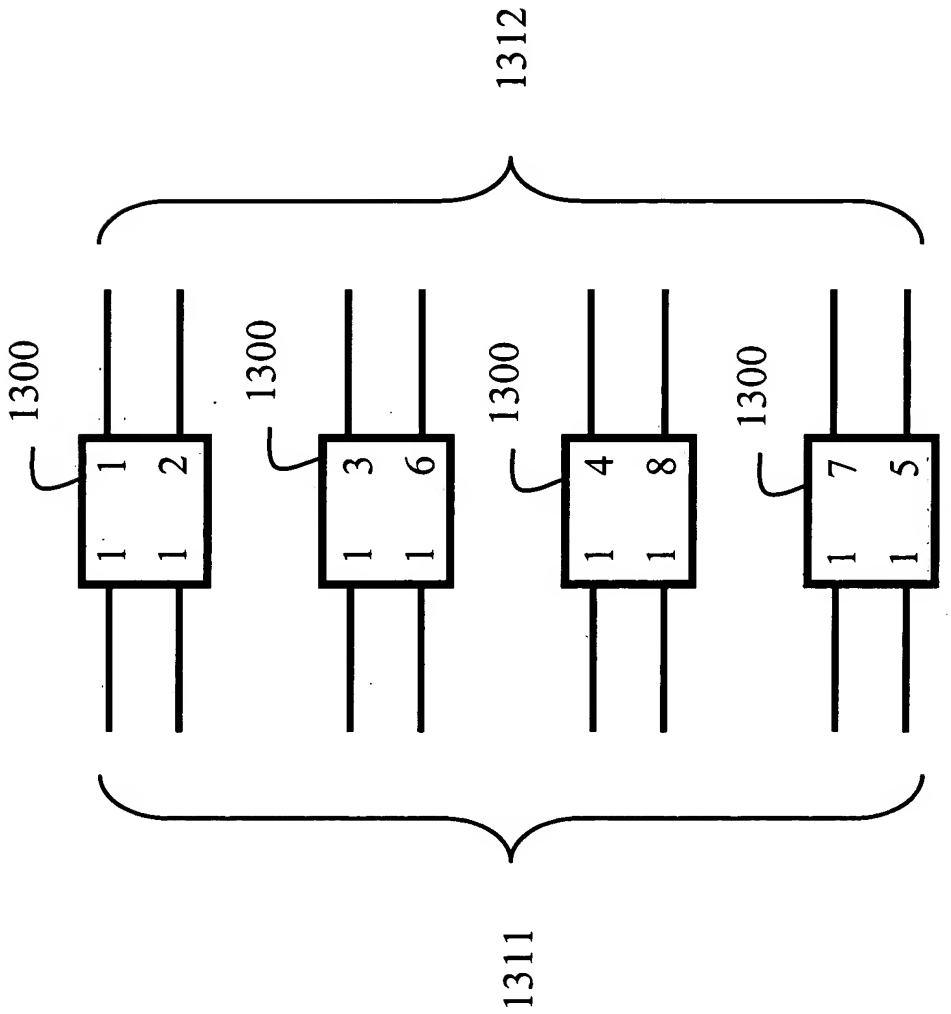

Figure 13

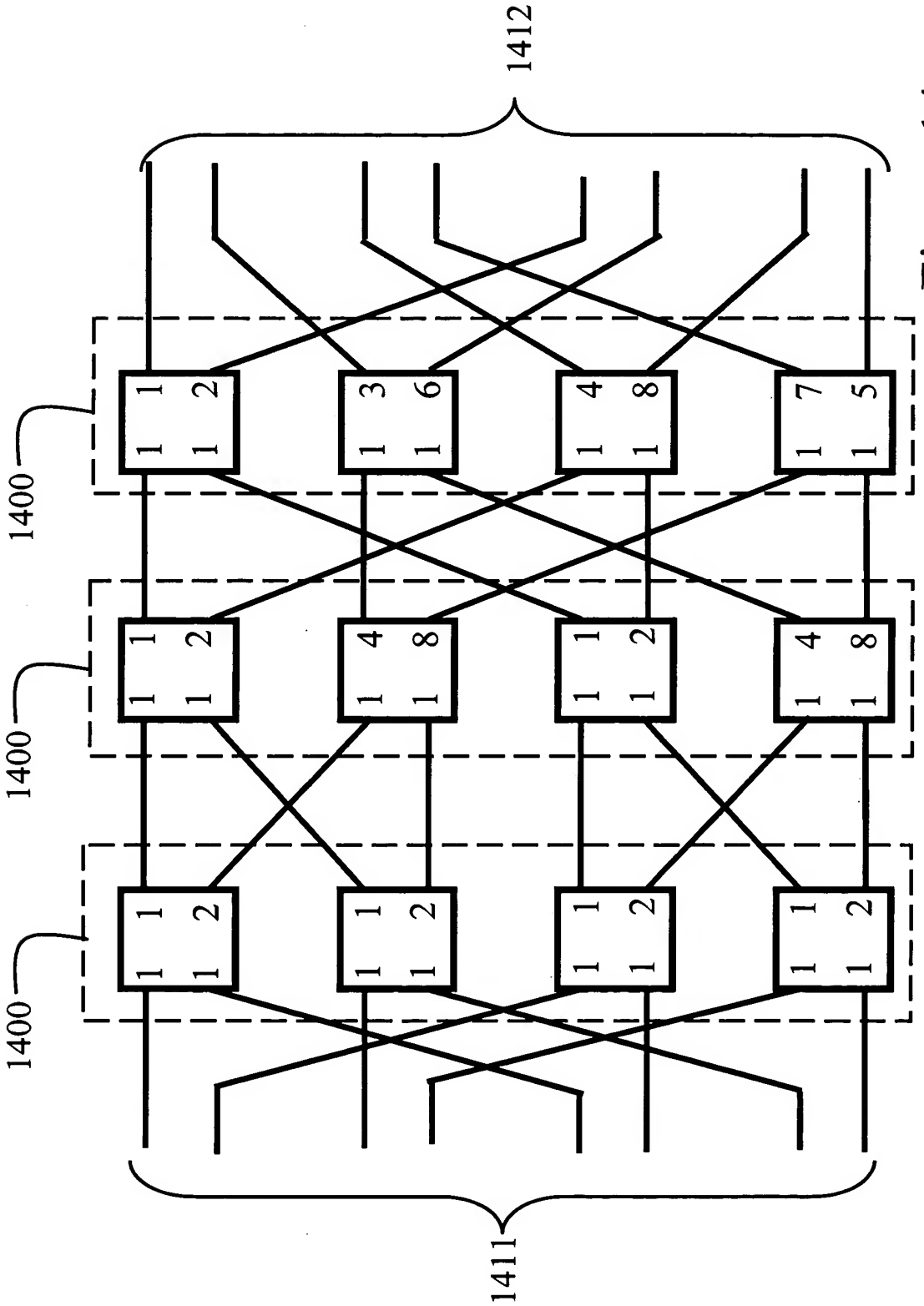
1412
1400
1400
1400
1411
1 1 2
1 1
1 3 6
1 1
1 4 8
1 1
1 7 5
1 1
1 1 2
1 1
1 4 8
1 1
1 1 2
1 1
1 4 8
1 1
1 1 2
1 1
1 1 2
1 1
1 1 2
1 1
1 1 2
1 1

Figure 14

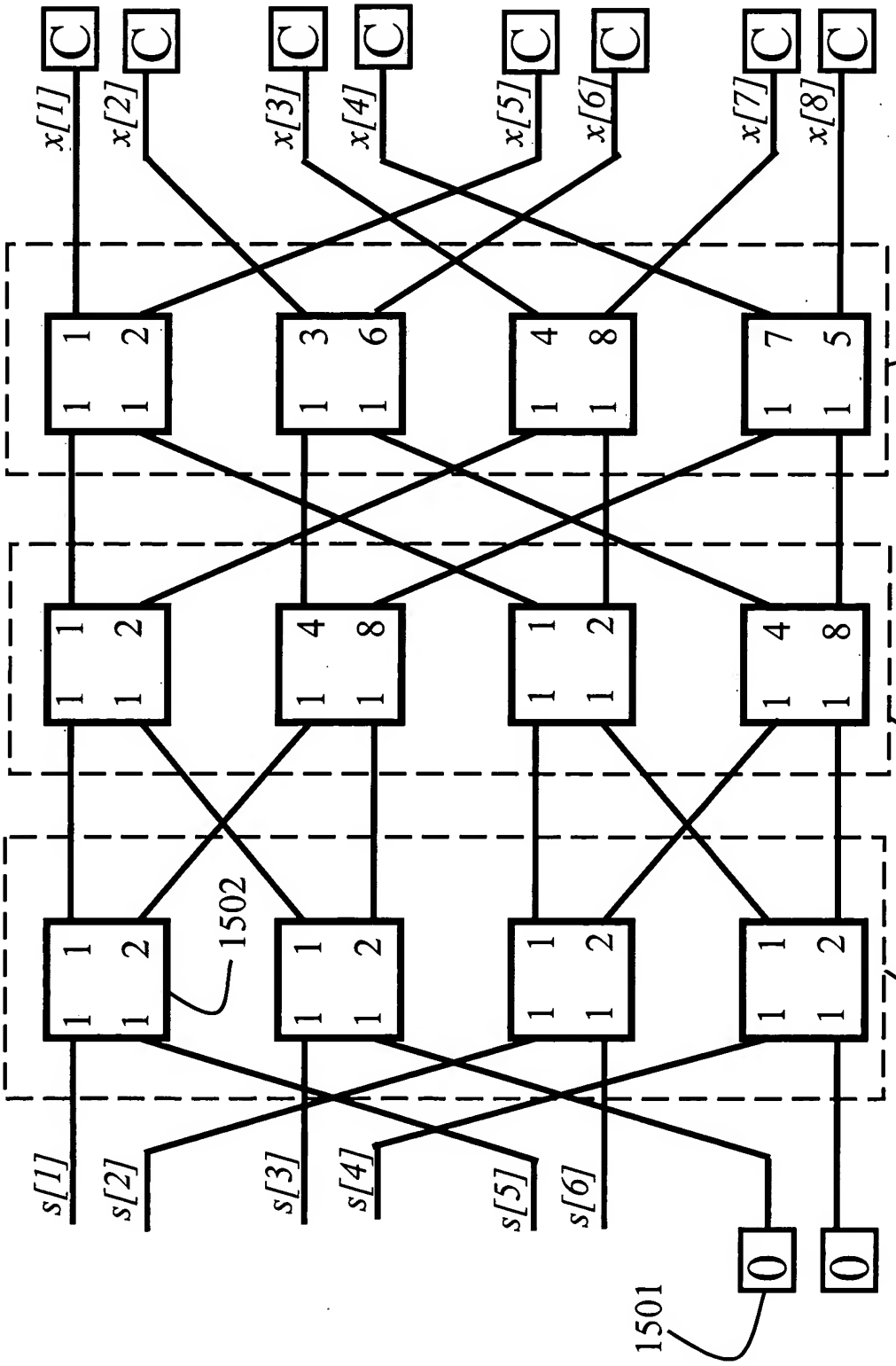
C
x[1]
x[2]
x[3]
x[4]
x[5]
x[6]
x[7]
x[8]
1 1 2
1 1
1 3 6
1 1
1 4 8
1 1
1 7 5
1 1
1530
1 1 2
1 1
1 4 8
1 1
1 1 2
1 1
1 4 8
1 1
1520
1502
1 1 2
1 1
1 1 2
1 1
1 1 2
1 1
1 1 2
1 1
1503
s[1]
s[2]
s[3]
s[4]
s[5]
s[6]
0
0
1501

Figure 15

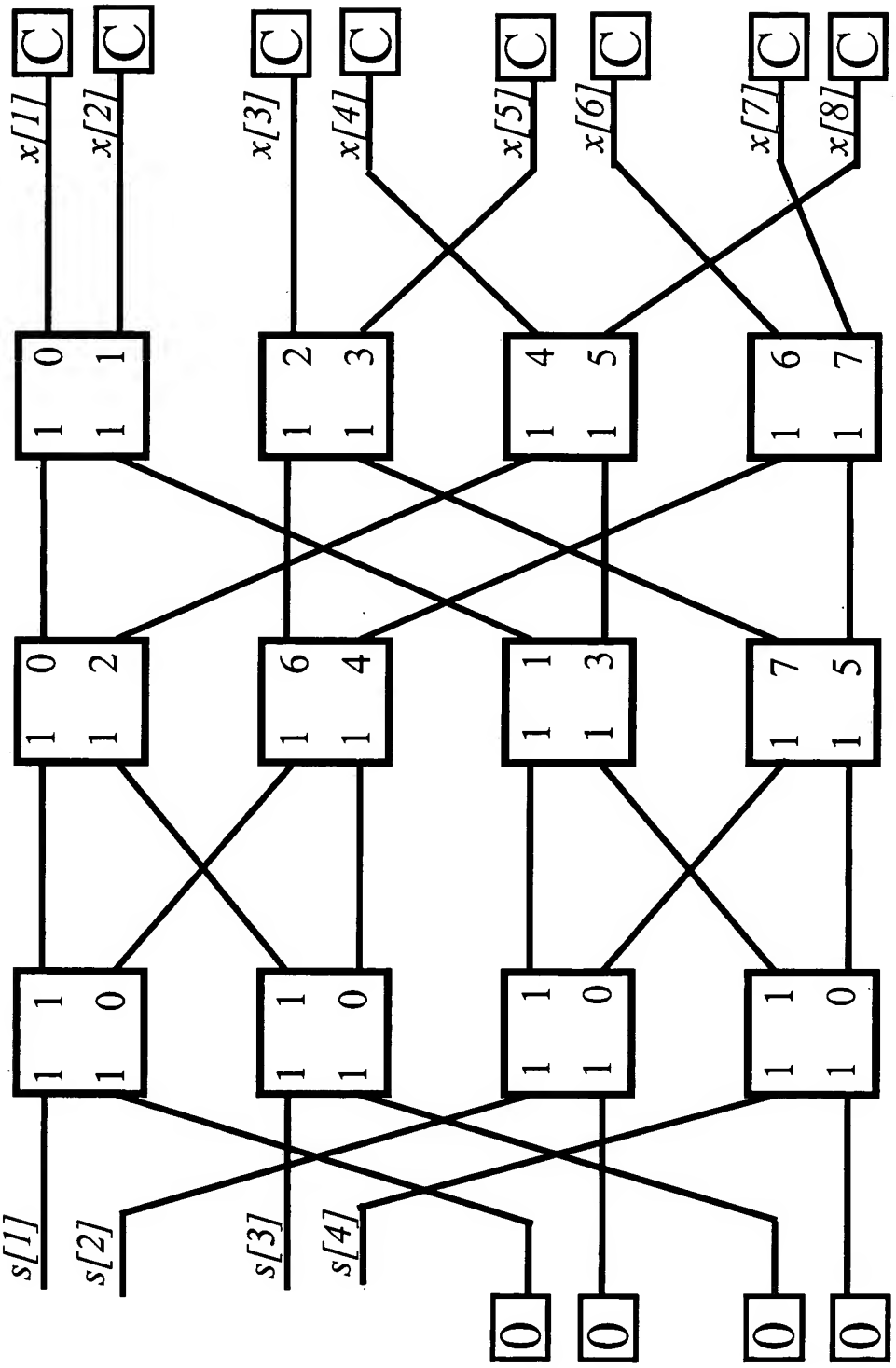

Figure 16

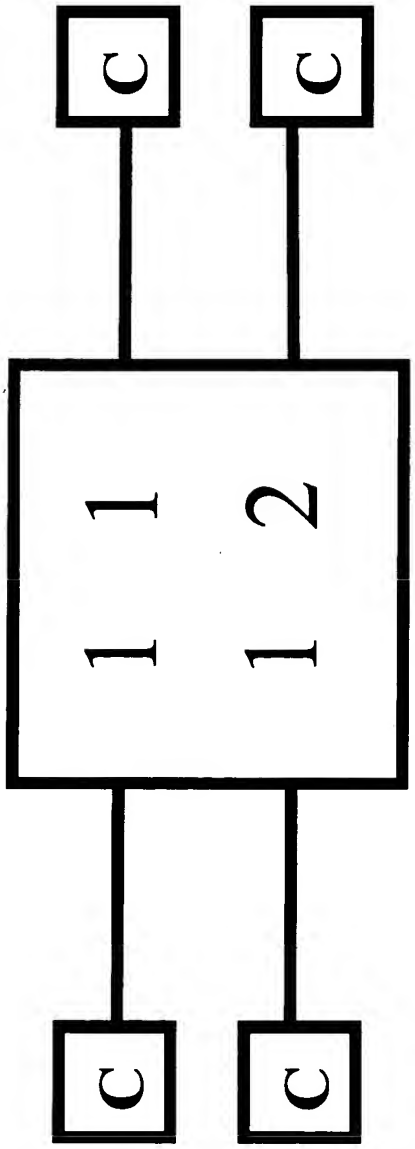

Figure 17

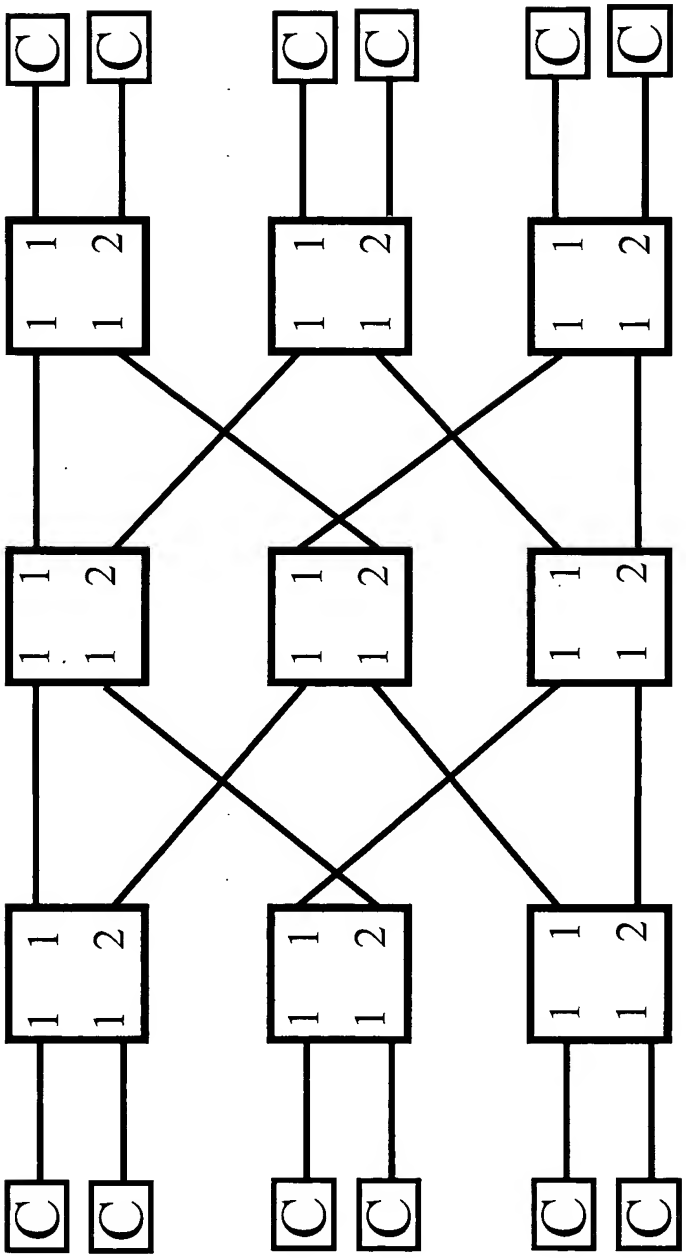

Figure 18

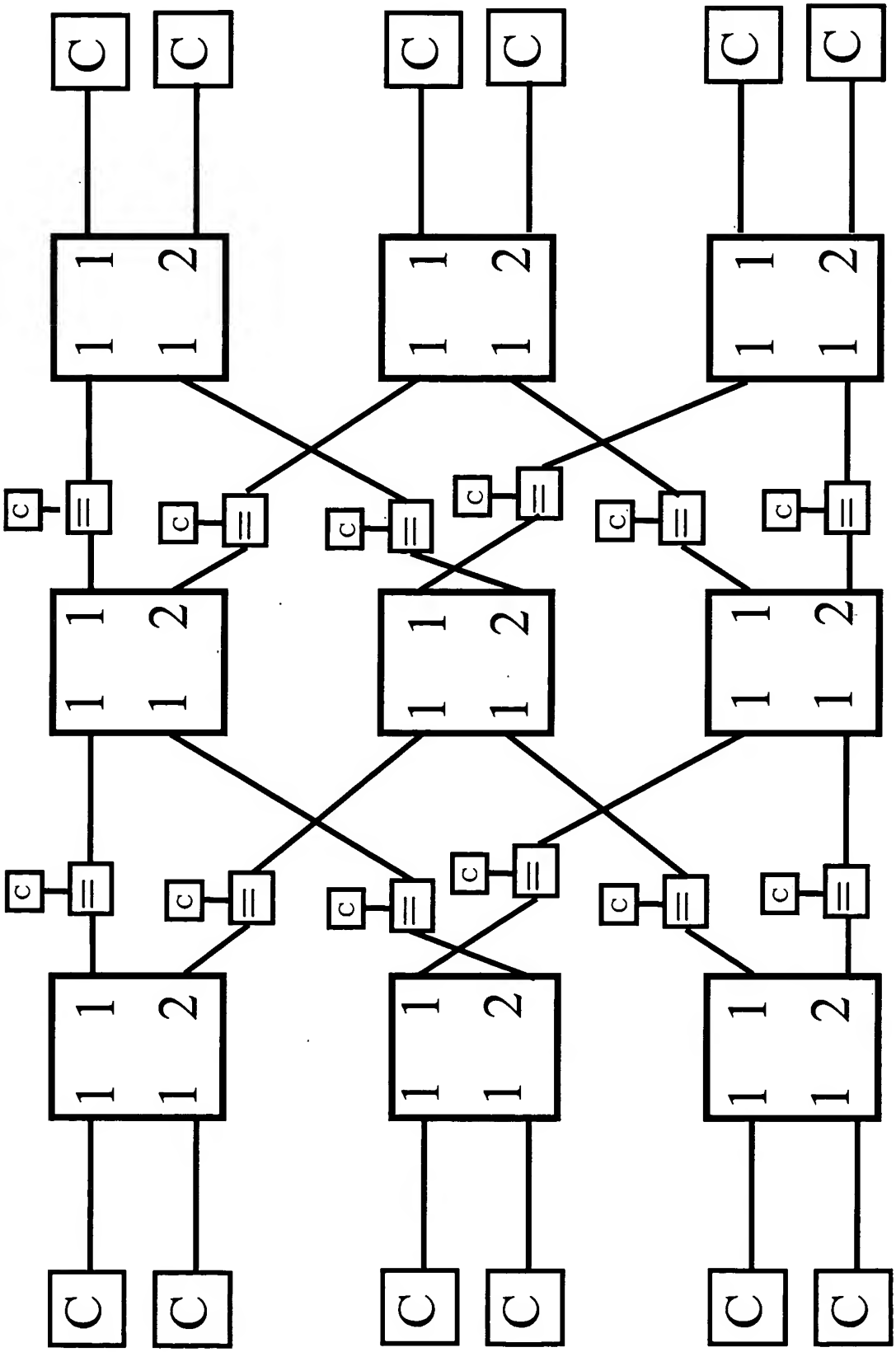

Figure 19

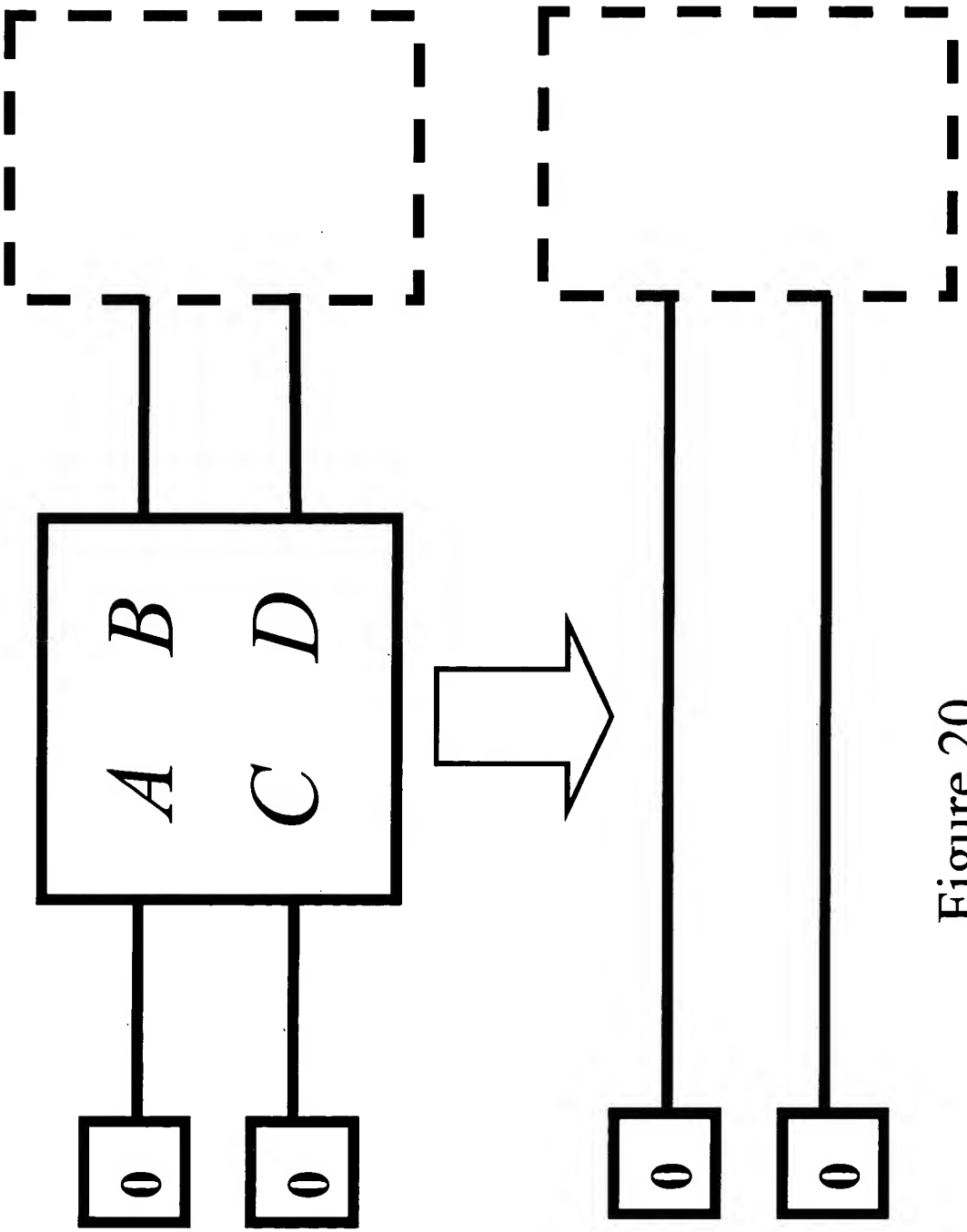

Figure 20

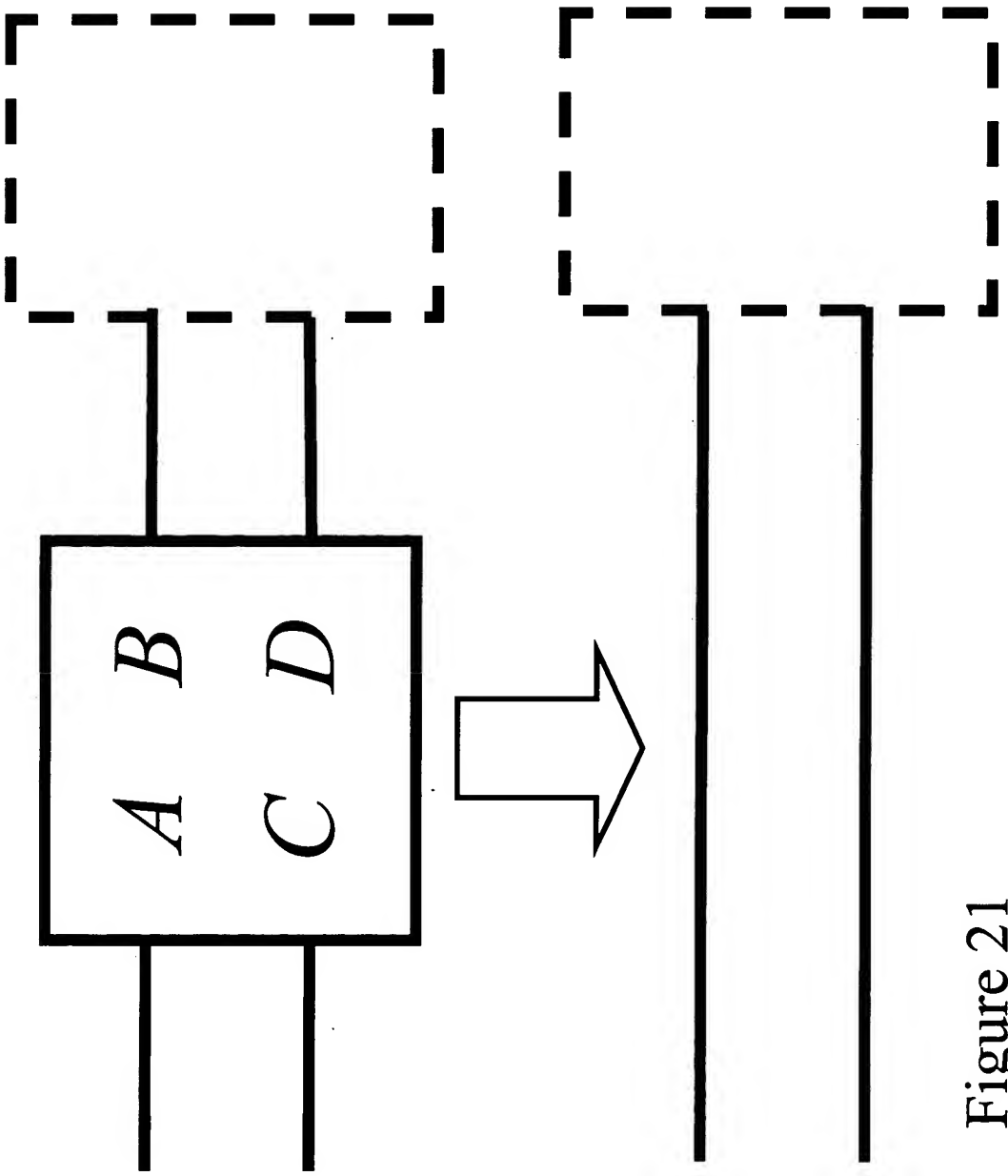

Figure 21

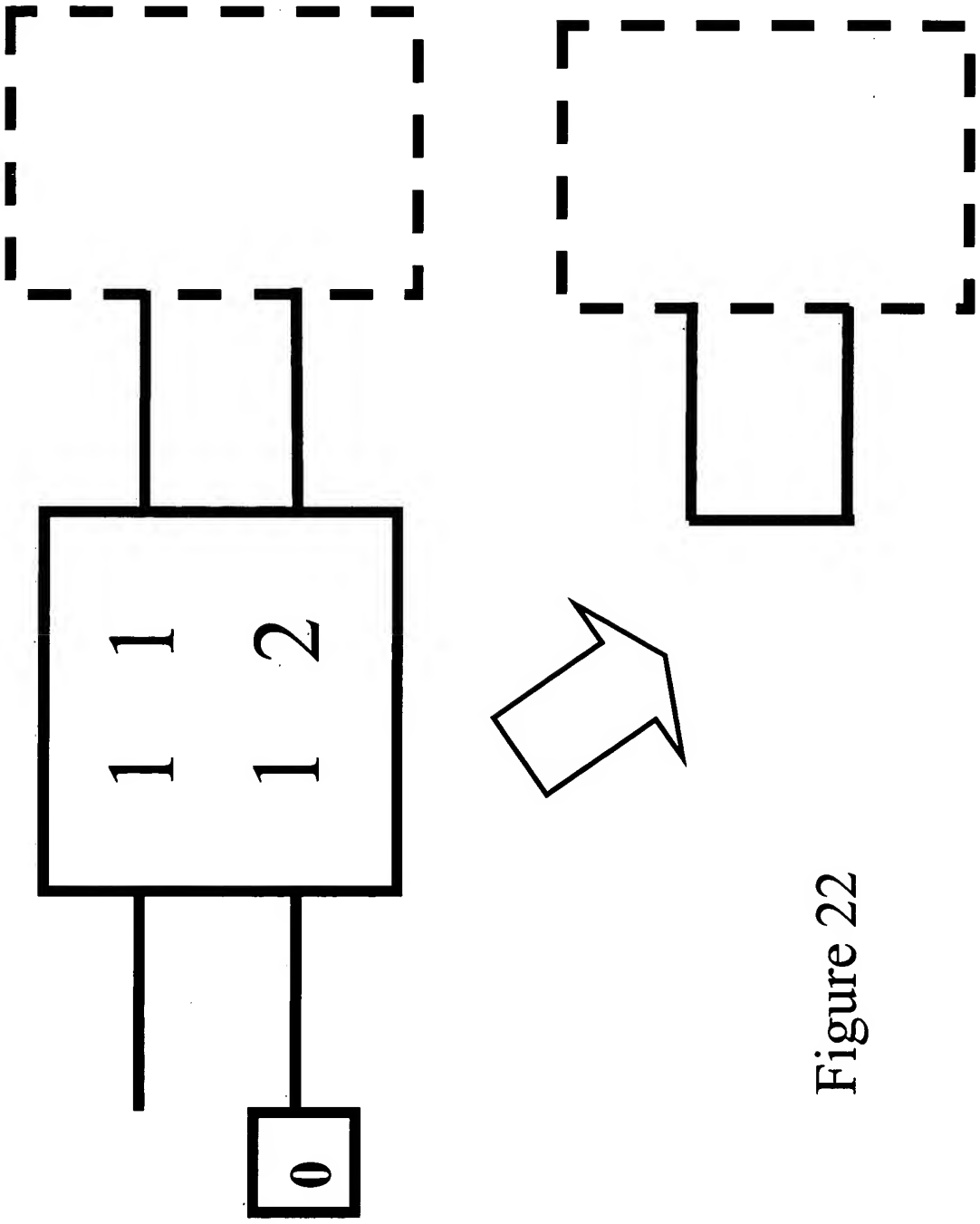

Figure 22

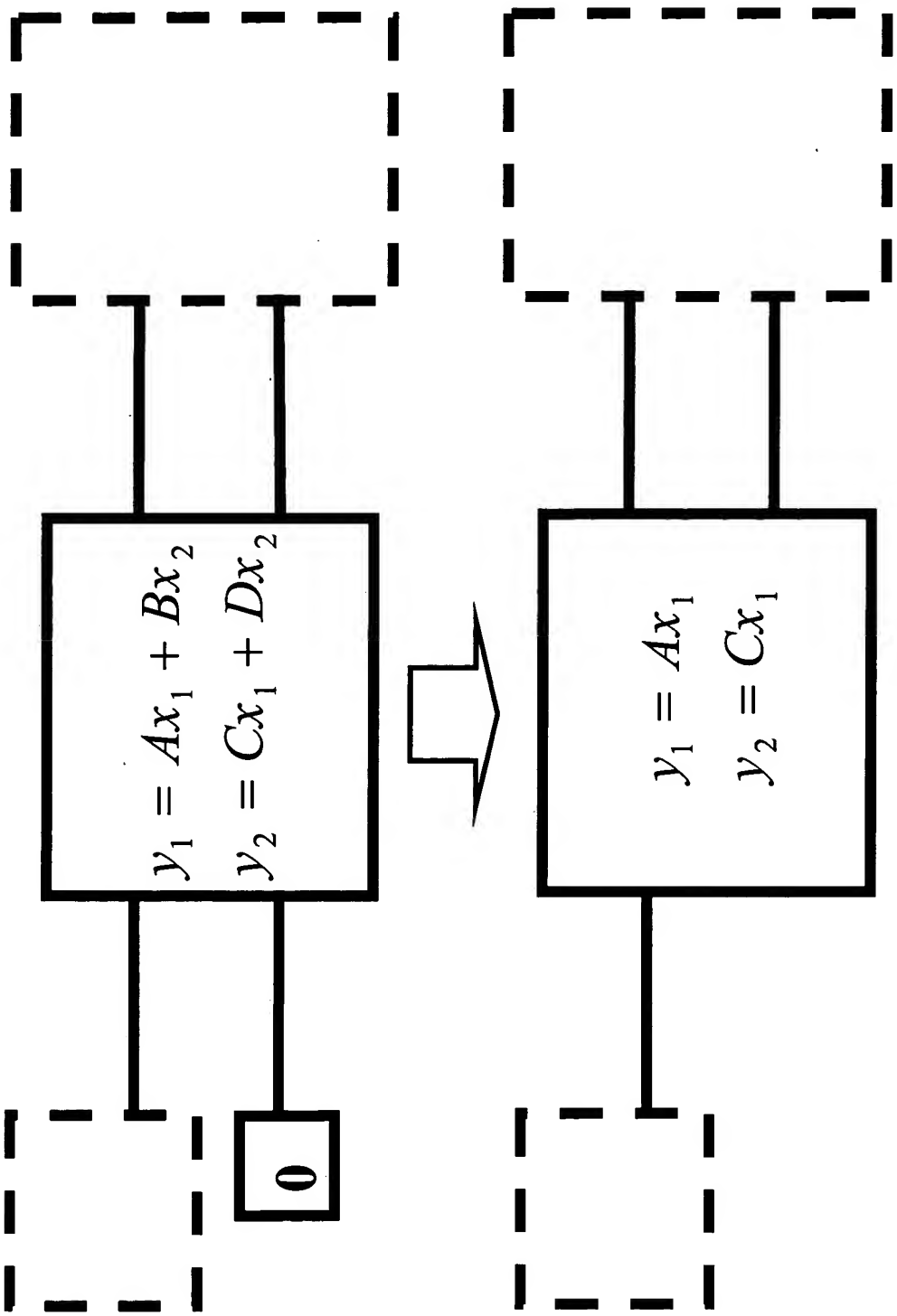

Figure 23

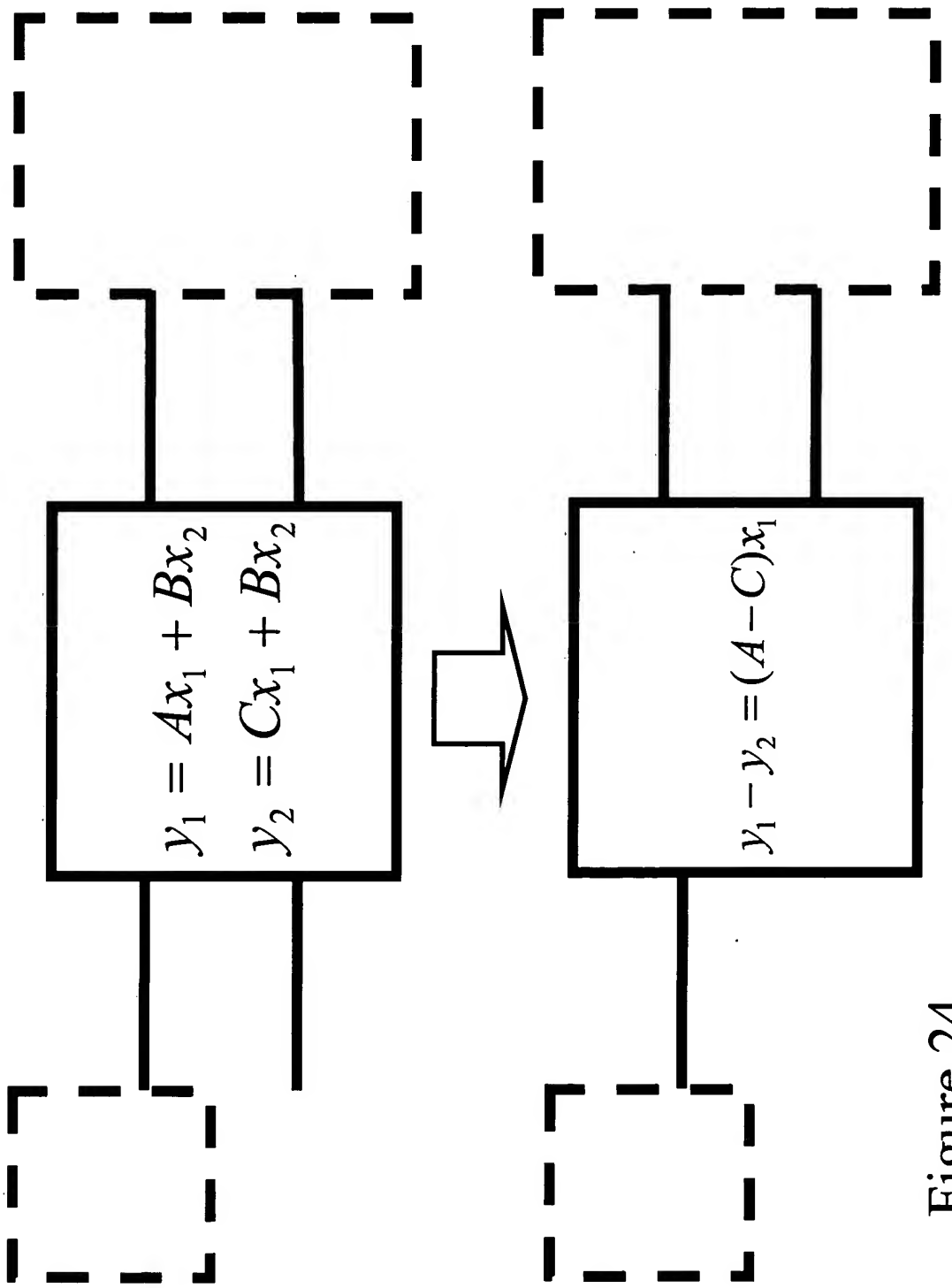

Figure 24

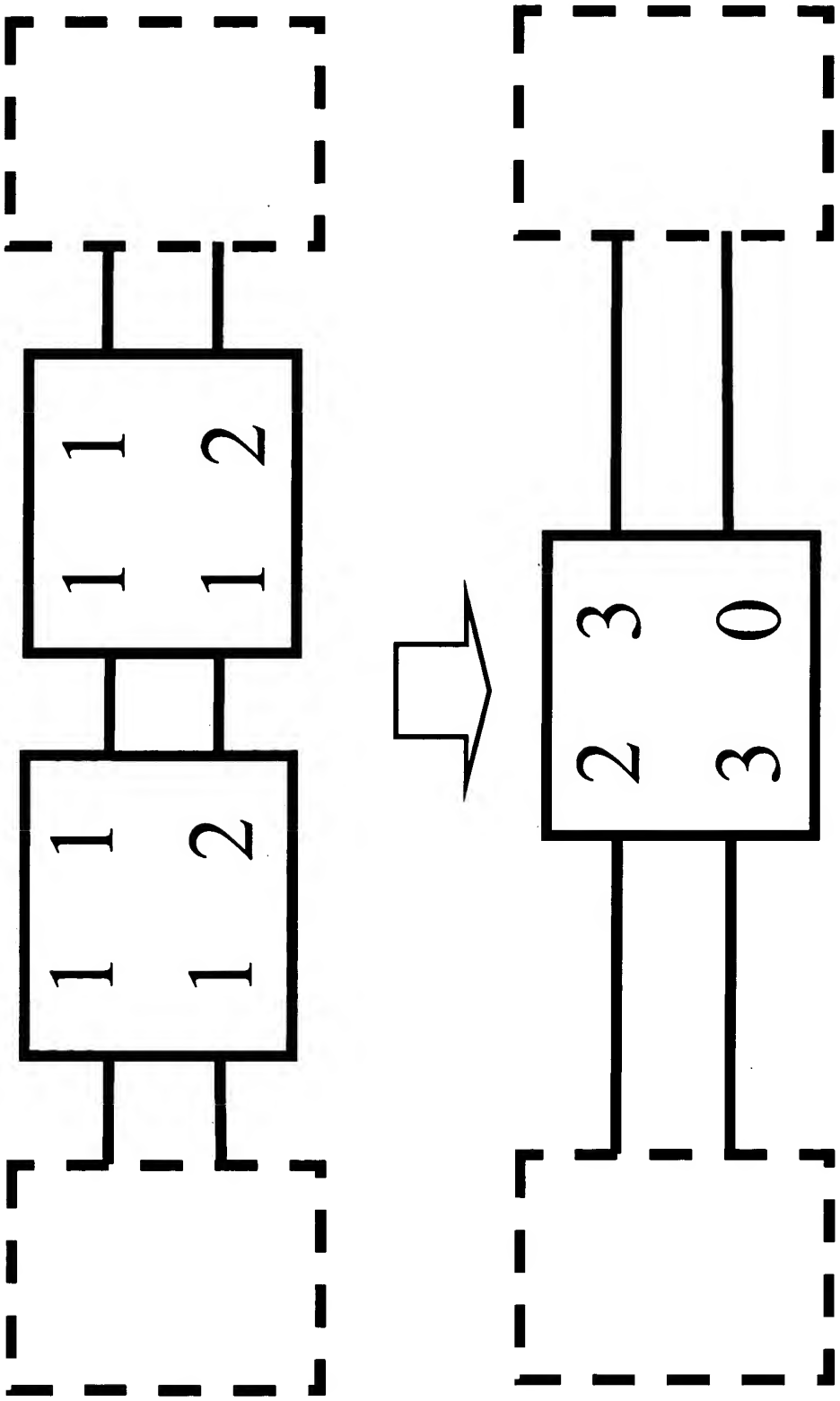

Figure 25

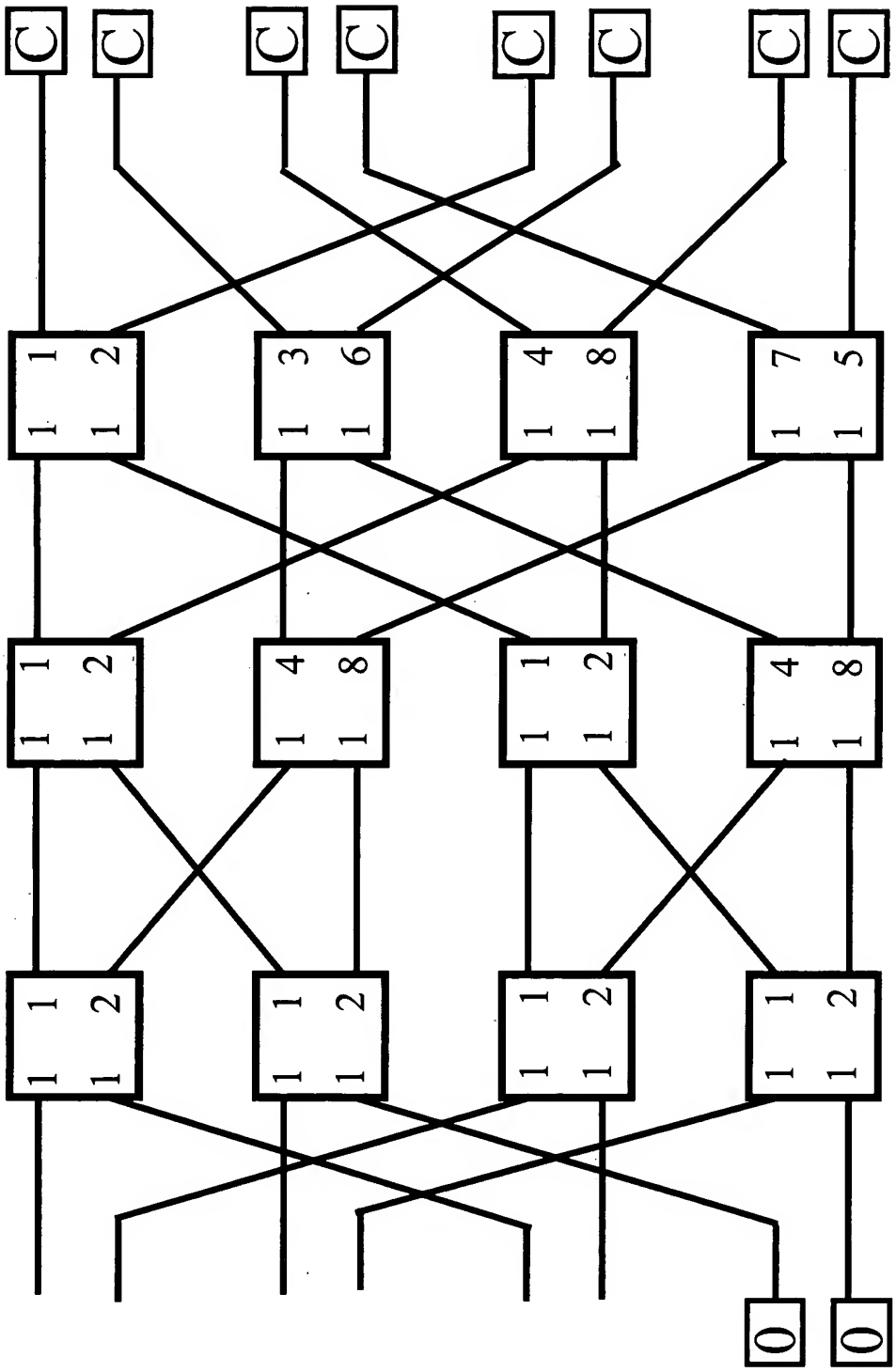
C C C C C C C C
1 1 2 1 1 3 6 1 1 4 8 1 1 7 5 1
1 1 2 1 1 4 8 1 1 1 2 1 1 4 8 1
1 1 2 1 1 1 2 1 1 1 2 1 1 1 2 1
0 0

Figure 26

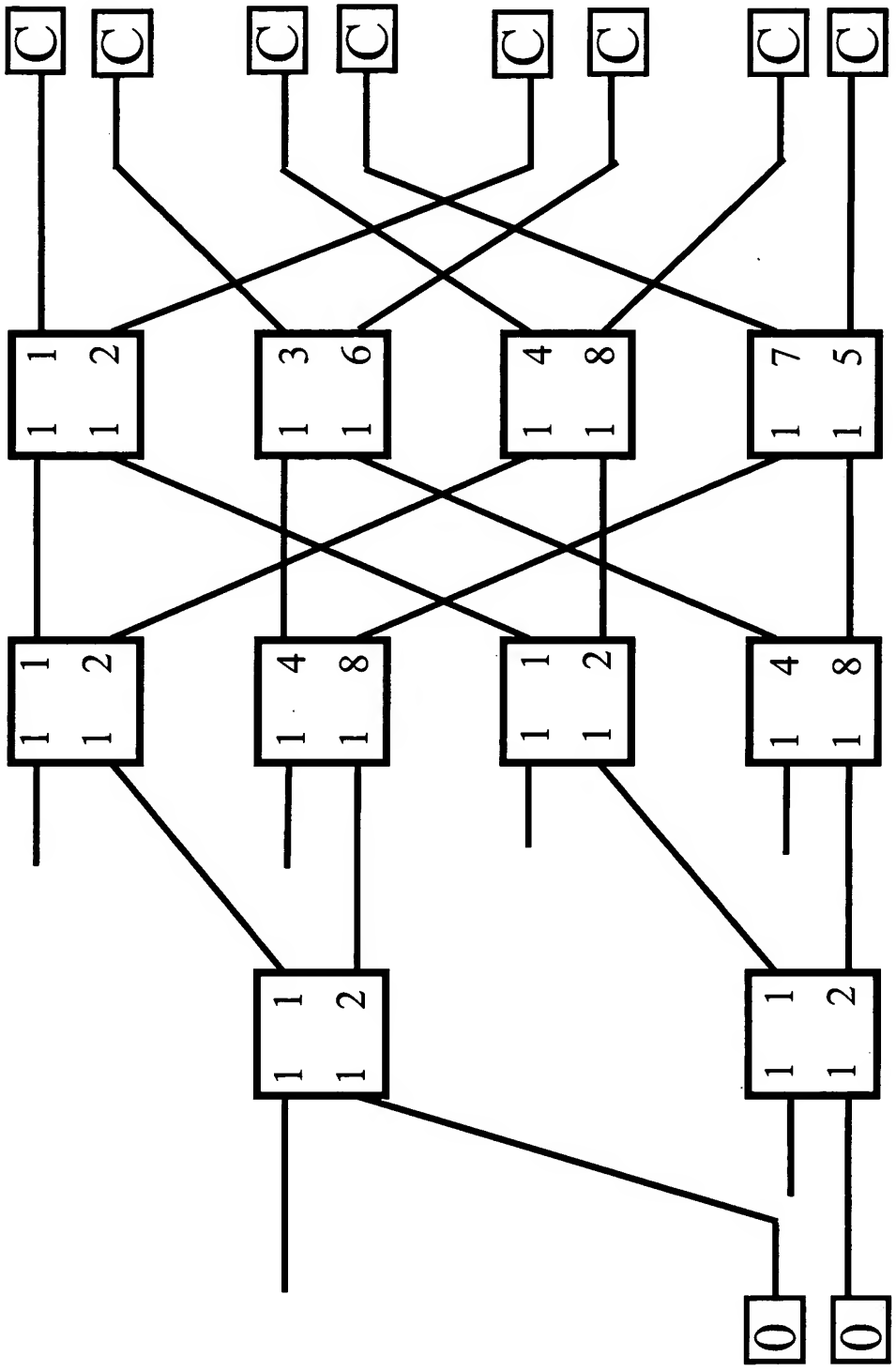
C
C
C
C
C
C
C
C
1 1 2
1 1
1 3 6
1 1
1 4 8
1 1
1 7 5
1 1
1 1 2
1 1
1 4 8
1 1
1 1 2
1 1
1 4 8
1 1
1 1 2
1 1
1 1 2
1 1
0
0

Figure 27

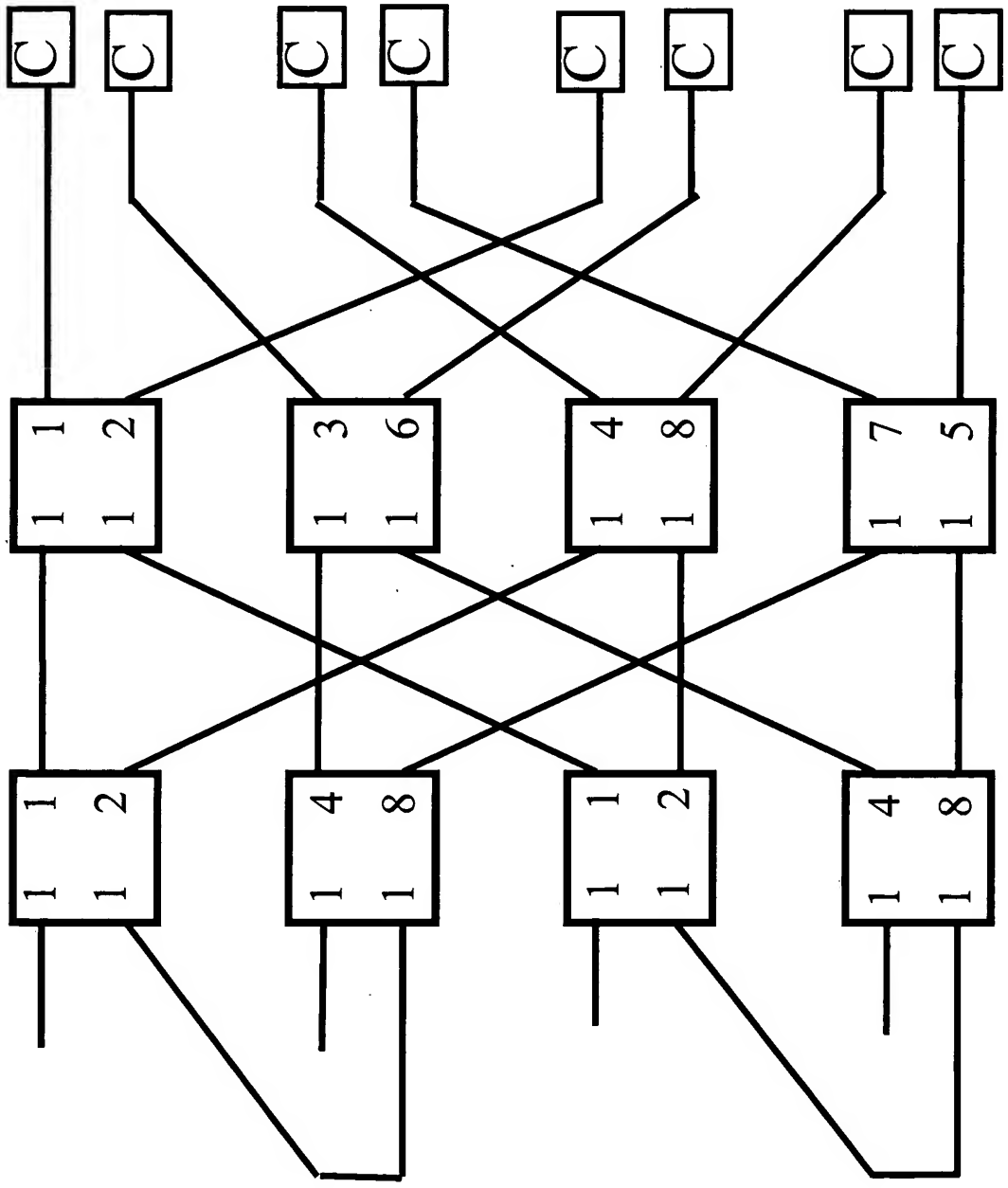

Figure 28

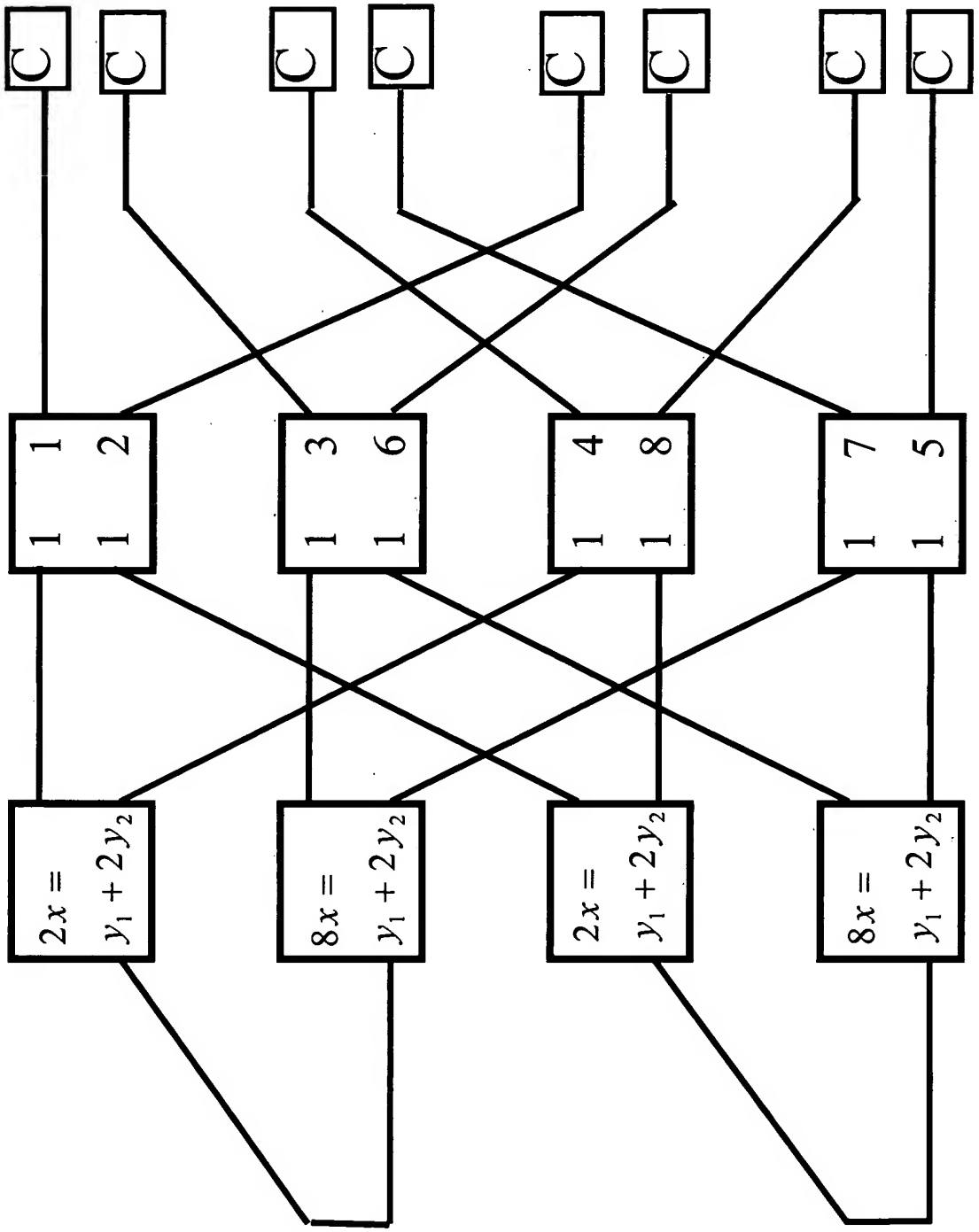
C
C
C
C
C
C
C
C
1 1 2
1 1
1 3 6
1 1
1 4 8
1 1
1 7 5
1 1
2x = y1 + 2y2
8x = y1 + 2y2
2x = y1 + 2y2
8x = y1 + 2y2

Figure 29

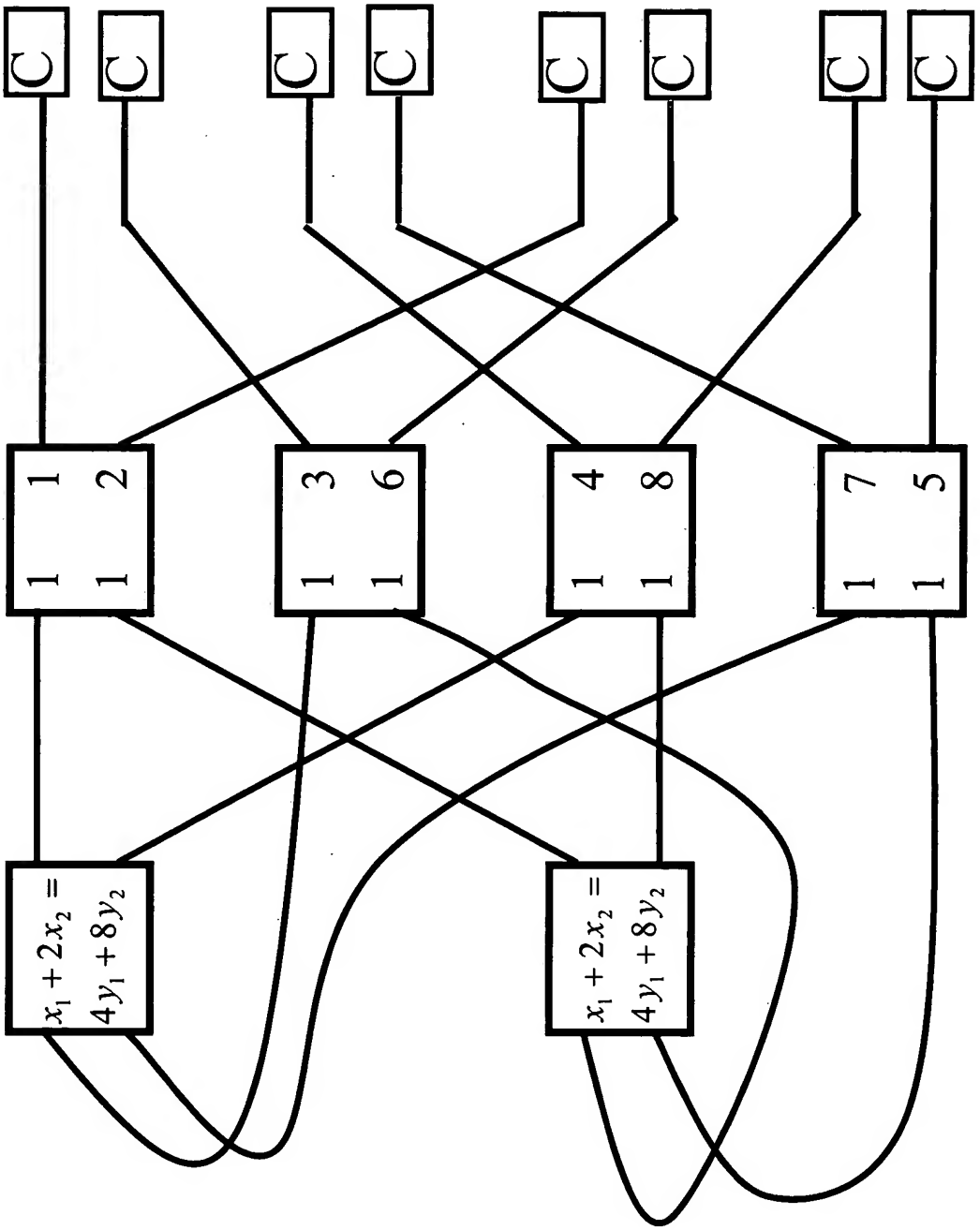
C
C
C
C
C
C
C
C
1 1 2
1 1
1 3 6
1 1
1 4 8
1 1
1 7 5
1 1
$x_1 + 2x_2 = 4y_1 + 8y_2$
$x_1 + 2x_2 = 4y_1 + 8y_2$

Figure 30

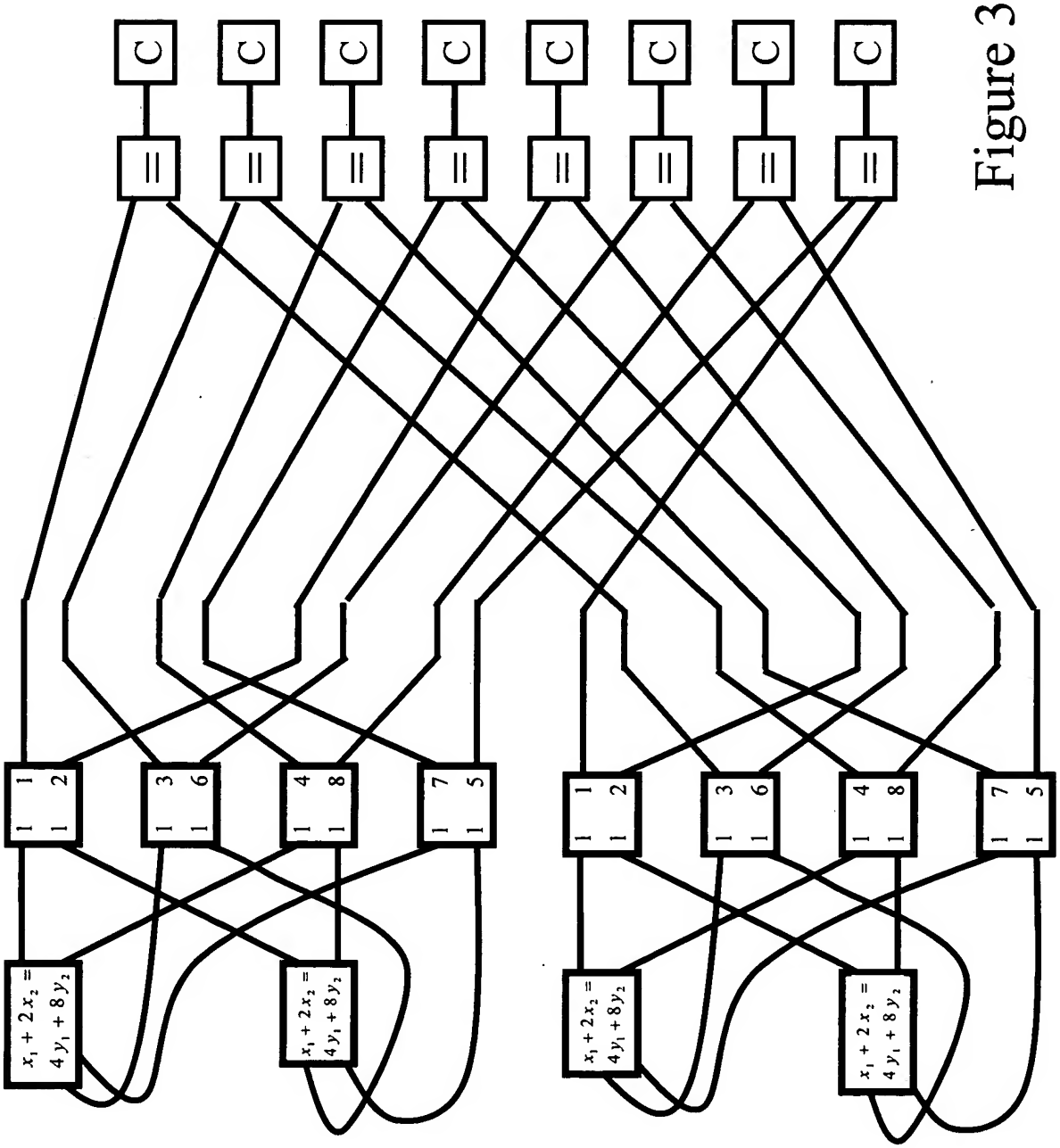

Figure 31

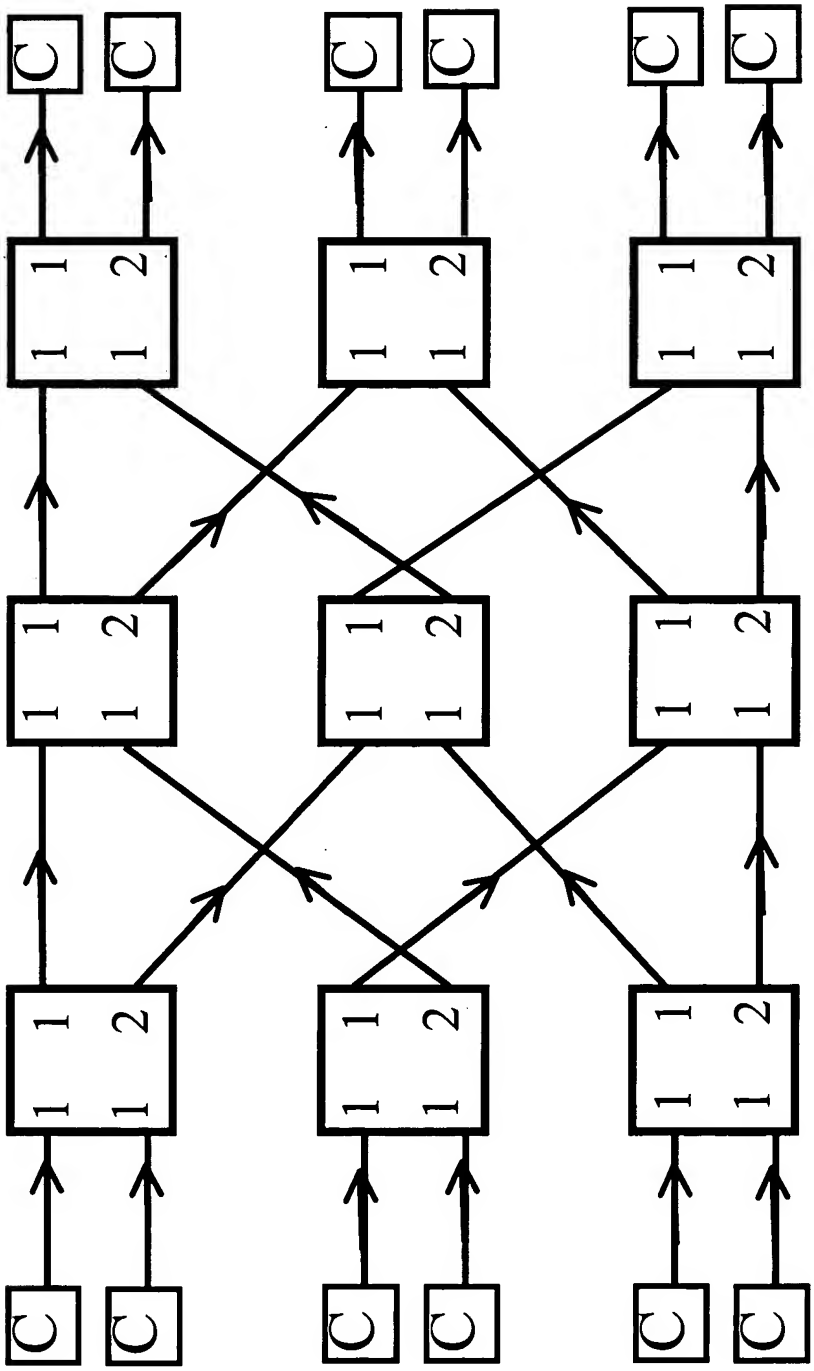

Figure 32

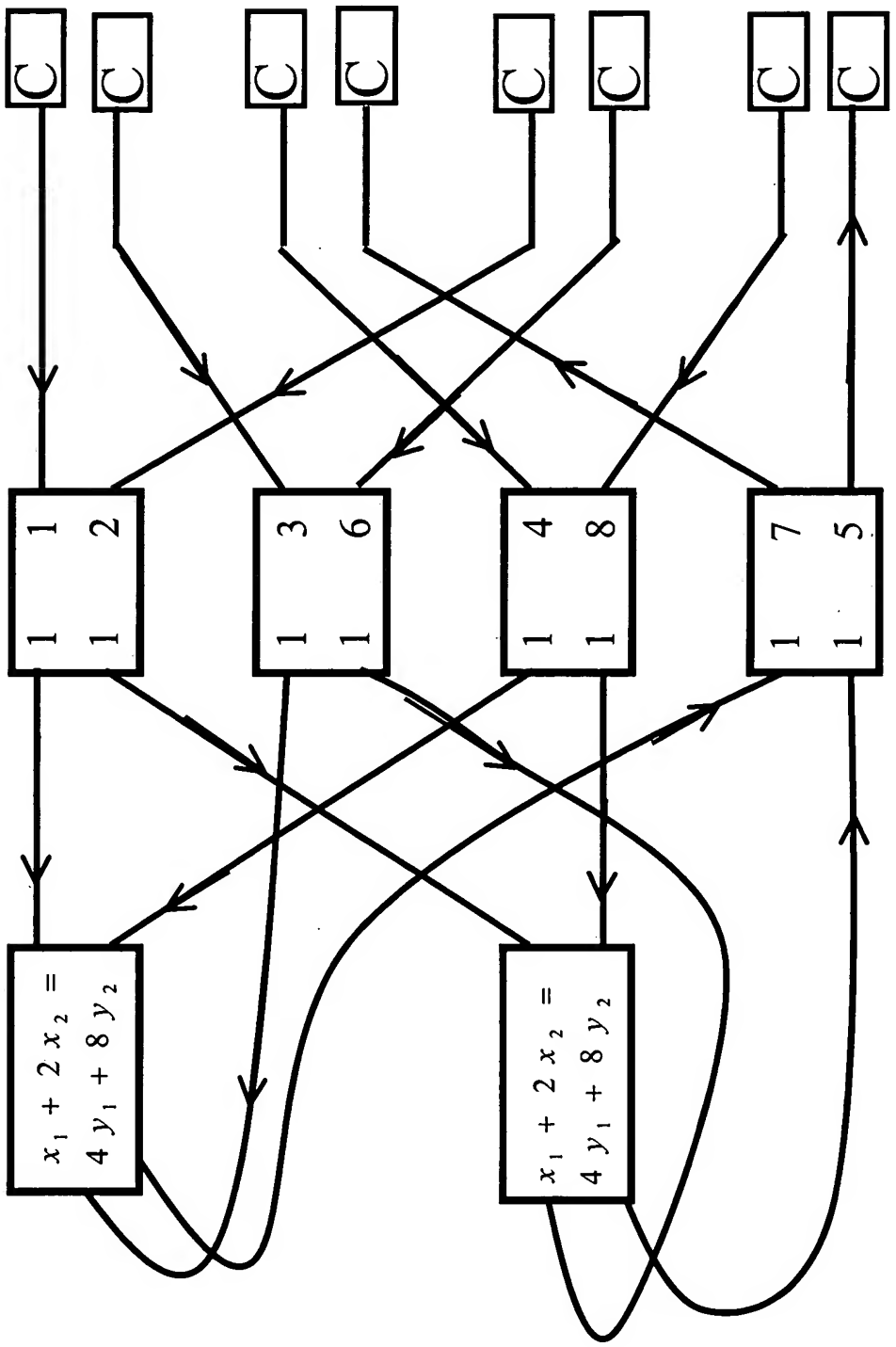
C
C
C
C
C
C
C
C
1 1 2
1 1
1 3 6
1 1
1 4 8
1 1
1 7 5
1 1
$x_1 + 2x_2 = 4y_1 + 8y_2$
$x_1 + 2x_2 = 4y_1 + 8y_2$

Figure 33

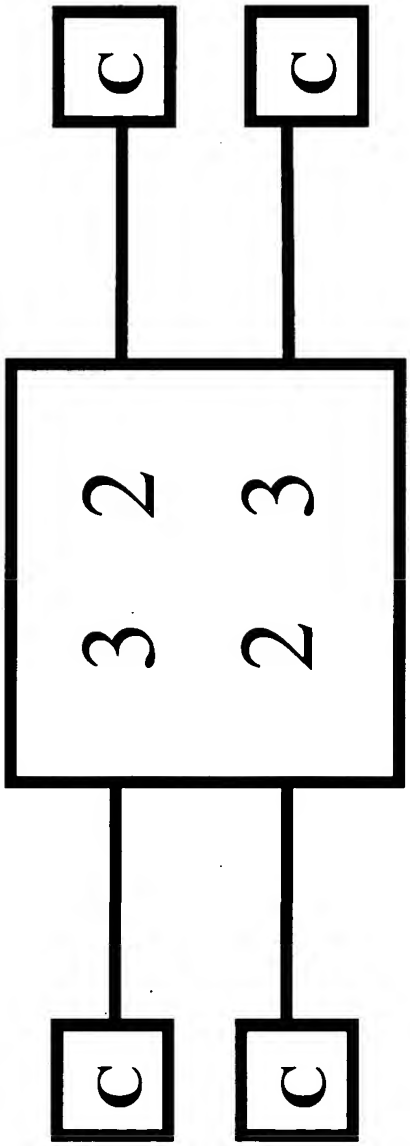

Figure 34